

Book reviews

Practical NIR Spectroscopy. By B. G. Osborne, T. Fearn & P. H. Hindle. Longmans, UK, 1993. 227pp. ISBN 0582-099463. Price: £65.00

Vibrational spectroscopy has long been used by the chemist as an important method for *qualitative* analysis. Thus, for example, in functional group identification of organic molecules infrared spectroscopy plays a very active role. The first near infrared (NIR) spectra—of solar emission—were recorded by Herschel as long ago as 1800 and the first NIR spectra of organic liquids were obtained in 1881. However, this method, as a means of qualitative analysis, has been rather neglected, largely as it is very difficult to make positive assignments, for complex molecules, of bands which generally result from combinations and overtones of fundamental vibrations—often those making hydrogen atoms.

In recent years the use of vibrational spectroscopy as a method for *quantitative* analysis has been actively developed. One of the main reasons for this upsurge has been the development of data handling systems which can store spectral data and perform the often rather complicated mathematical manipulations necessary for quantitative analysis. It is in this field that NIR spectroscopy has come into its own. The low absorptivities of NIR absorption means that long pathlengths may be used; in some systems transmission through intact samples is possible, in others measurements by diffuse reflectance from the surfaces of opaque materials may be made. Sampling is rarely a problem since most optical materials and water have low absorptivity in this region; thus spectra of samples in glass vessels and spectra of aqueous solution may be recorded. These advantages are shared by another vibrational spectroscopic technique namely FT-Raman, although it is fair to say that so far NIR spectroscopy has been more widely used in quantitative analysis than has Raman spectroscopy.

The food industry has a long history of using NIR spectroscopy. Thus it is no surprise that NIR has now become one of the most widely used methods for food and beverage analysis. This book is, therefore, timely. It is also well written and logically set out. It covers fundamental principles. Thus, the origin of NIR bands is given a detailed treatment both in terms of how radiation interacts with matter to produce absorption bands and of which vibrations give rise to which absorption. There is an extremely useful chapter on NIR instrumentality. This will be of much use to those

carrying out experiments in the area; thus we have information on spectrometers, sources, various types of cell, fibre optics and sample preparation. The last chapter of the book returns to the theme of experimentation. Here many practical aspects of NIR analysis are covered, such as design of calibration experiments, standardisation of experiments and analytical quality assurance. Sandwiched between these two essentially practical chapters are two sections giving an outline (where mathematics is kept to a sensible minimum) of calibration methods, and one chapter, which is perhaps the central part of the whole book, discussing application of NIR spectroscopy in food and beverage analysis.

In conclusion I can recommend this book to those working in the food industry, and to those with an interest in vibrational spectroscopy who wish to learn more about its role in quantitative analysis.

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Enzymes in Food Processing, Third edition. Edited by T. Nagodawithana & G. Reed. Academic Press Inc., London, 1993. xxiv + 480 pp. ISBN 0-12-513630-7.

This is the Third Edition of the book, previous editions appearing in 1967 and 1975. According to the preface it has been completely rewritten because of the extensive changes in the way enzymes are used and the availability of new enzymes. Chapters on enzyme functionality and the effect of environmental parameters have been expanded and chapters on genetic modifications of enzymes and the uses of enzymes in fish processing have been included.

The book can be divided into three main sections, which are as follows:

- (1) General characteristics of enzymes with chapters on; Environmental effects on enzyme activity; Modern methods of enzyme expression and design; and Immobilised enzymes. These chapters present the basic concepts required to understand enzyme usage in food processing.
- (2) Chapters dealing with specific types of enzymes. These are: Carbohydrases; Proteases; Lipases; Oxidoreductases. Some applications of oxidoreductases. The last chapter is quite short and perhaps could have been combined with the previous one.
- (3) Chapters covering applications of enzymes in different commodity sectors. These are: Milling